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(71) Applicant : CHIYODA CORP

ISHIGAKI:KK

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(72) Inventor : KIMURA TAKASHI  
TOYAMA TATSUYA  
NOMI KENJI  
HASHIMOTO HIDEO  
MITANI YUKITOSHI

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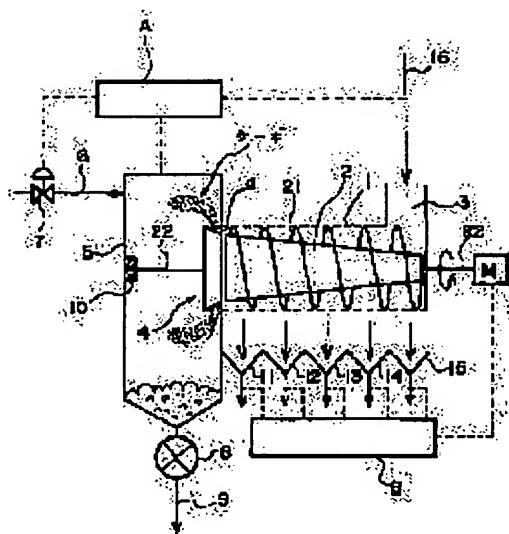
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## (54) SCREW PRESS

### (57) Abstract:

**PROBLEM TO BE SOLVED:** To provide a screw press which may be operated under an increased supply pressure on the raw material to be treated.

**SOLUTION:** This screw press has a filter cylinder 1 and a screw 2 inserted and disposed therein and has the functions to discharge the separated liquid outside through the peripheral wall of the filter cylinder by compressing the raw material to be treated supplied into the filter cylinder 1 by the screw 2 and to discharge filter cake outside from the spacing part 3 formed at the front end of the filter cylinder 1. The screw press has a pressurizing chamber 5 which encloses the spacing part



(a) formed at the front end of the filter cylinder 1. The pressurizing chamber 5 has a pressurized gas supply port and a filter cake discharge port.

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**CLAIMS****[Claim(s)]**

[Claim 1] By having the screw by which insertion arrangement was carried out in a filtration cylinder and its interior, and squeezing with a screw the processed raw material supplied in the filtration cylinder In the screw press which has the function to make a supernatant liquid discharge to the exterior through the filtration cylinder circumference wall, and to make a filter cake discharge to the exterior from the gap section formed at the tip of a filtration cylinder (i) It is the screw press characterized by to have the pressurized room which surrounds the gap section formed at this tip of a filtration cylinder, and (ii) this pressurized room having pressurization gas supply opening and a filter cake exhaust port.

[Claim 2] The screw press of claim 1 which has a differential pressure regulatory mechanism for adjusting the differential pressure of a processed feeding pressure and pressurized-room internal pressure.

[Claim 3] Claim 1 which has the amount distribution measurement device of filtrate in which the shaft orientations of a filtration cylinder were met, or 2 screw presses.

[Claim 4] The screw press of claim 3 constituted so that the rotational frequency of a screw might be controlled according to the amount distribution of filtrate in alignment with the shaft orientations of a filtration cylinder.

[Claim 5] One screw press of claims 1-4 whose screws are what does not have a screw wing in the point.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to a screw press.

[0002]

[Description of the Prior Art] The screw press is known as a filter for filtering the mixture (slurry liquid) of a solid particulate and a liquid. When this screw press has the screw by which insertion arrangement was carried out in a filtration cylinder and its interior and a processed raw material is supplied to them from feeding opening of that filtration cylinder, that processed raw material That rotation screw squeezes, the supernatant liquid produced by this squeezing is discharged outside through the bore of a large number formed in that filtration barrel wall, and, on the other hand, the filter cake produced by that squeezing is extruded and discharged from the gap section for filter cake discharge formed at that tip of a filtration cylinder. By the way, although such a screw press is usually operated under ordinary pressure thru/or pressurization, the filtration velocity in this case improves, so that that processed raw material supply pressure becomes high. However, if the supply pressure became high too much, since a part of supernatant liquid would produce the so-called liquid omission phenomenon leaked with a filter cake from the tip gap section, even if the supply pressure was high, about [ 0.5kg/cm<sup>2</sup> ] G were a limit.

[0003]

[Problem(s) to be Solved by the Invention] This invention makes it the technical problem to offer the screw press which can be operated by the raised processed raw material supply pressure.

[0004]

[Means for Solving the Problem] this invention persons came to complete this invention, as a result of repeating research wholeheartedly that said technical problem should be solved. Namely, by according to this invention, having the screw by which insertion arrangement was carried out in a filtration cylinder and its interior, and squeezing with a screw the processed raw material supplied in the filtration cylinder In the screw press which has the function to make a supernatant liquid discharge to the exterior through the filtration cylinder circumference wall, and to make a filter cake discharge to the exterior from the gap section formed at the tip of a filtration cylinder (i) The screw press characterized by to have the pressurized room which surrounds the gap section formed at this tip of a filtration cylinder, and (ii) this pressurized room having pressurization gas supply opening and a filter cake exhaust port is offered.

[0005]

[Embodiment of the Invention] The screw press of this invention is explained in full detail with a drawing. Drawing 1 shows the explanation block diagram of the screw press of this invention. Drawing 1 -- setting -- 1 -- a filtration cylinder and 2 -- a screw and 3 -- in processed feeding opening and 4, a filtrate uptake member and 21 show a screw wing, and, as for a presser and 5, a shows the gap section for filter cake discharge, as for a pressurized room, and 11-15. The filtration cylinder 1 usually becomes a peripheral wall from the metal barrel which has many bores. A screw 2 consists of \*\*\*\*\* which has the spiral screw wing 21. That shaft diameter becomes large towards that point, and, as for this screw 2,

is squeezed by such big pressure that a processed raw material goes to the point of a filtration cylinder. The screw shaft 22 is attached to a screw 2, the edge of the screw shaft of one of these is connected with Motor M, the screw shaft of the another side penetrates the core of a presser 4, and the edge is supported by bearing 10. A presser 4 is the board of a truncated-cone configuration, arrangement immobilization is carried out at tip opening of the filtration cylinder 1, and the annular space section a for filter cake extrusion discharge is formed between the periphery edge of the presser, and a filtration cylinder internal surface. By advancing a presser 4, the clearance between the gap sections a (path clearance) can be narrowed, and the clearance between the gap sections a can be \*\*\*\*(ed) by on the other hand reversing it. This thing is not illustrated, although the pressure regulatory mechanism of the common use which consists of cylinders operated with pneumatic pressure or oil pressure is attached to that presser 4 in order to make a presser 4 \*\* approximately. The screw press which consists of a presser 4 arranged by the above mentioned filtration cylinder 1, the screw 2 arranged in the interior, and tip opening of the filtration cylinder is conventionally well-known.

[0006] In such a screw press, if a processed raw material is supplied from the feed hopper 3, the processed raw material will be fed by rotation of the screw 2 by Motor M in the direction of a tip in the inside of a filtration cylinder. In this case, since it has expanded as the shaft diameter of a screw 2 goes in that direction of a tip, a processed raw material will be squeezed by the bigger pressure. The liquid in a processed raw material is separated by this squeezing, this sejunction water flows into the exterior as filtrate through the bore of a large number formed in the peripheral wall side in that filtration cylinder, it decreases toward the direction of a tip of a filtration cylinder, and from the filtration cylinder tip gap section a, a filter cake is extruded and the liquid content in a processed raw material is discharged. As it is the above, when carrying out the expression of the processed raw material and separating into filtrate and a solid-state, the solid-liquid-separation rate can be raised by raising the supply pressure of a processed raw material. However, if this supply pressure becomes high too much, the liquid omission phenomenon which a supernatant liquid leaks through the detailed opening in the filter cake which exists in the tip gap section of that filtration cylinder will come to arise. When such a liquid omission phenomenon comes to arise, it becomes impossible to already perform smooth solid liquid separation. Therefore, the conventional screw press is operated by the processed raw material supply pressure which does not produce the liquid omission phenomenon, usual, and the supply pressure 0.5kg/cm<sup>2</sup> or less.

[0007] Even if the screw press of this invention raises and operates a processed raw material supply pressure, as shown in drawing 1, it is characterized by having the pressurized room 5 which surrounds the tip gap section a of the filtration cylinder 1, so that said liquid omission phenomenon may not arise. This pressurized room consists of proof-pressure containers, and especially that configuration is not restrained. Pressure gas supply opening is formed in said pressurized room 5, and the pressure gas supply line 6 is connected with the feed hopper. Moreover, the filter cake exhaust port for discharging to outdoor the filter cake discharged from the gap section a is arranged in this pressurized room 5, and the filter cake exhaust pipe 9 is connected with this exhaust port through the filter cake discharge device 8. This discharge device 8 can consist of a closing motion bulb for making the filter cake in a pressurized room discharge to outdoor, and can make an indoor filter cake discharge to outdoor by that disconnection. The conventionally well-known solid matter discharge device in which it is used as such a cake discharge device in order to discharge the solid matter in a tank to the exterior is employable.

[0008] When carrying out filtration processing of the processed raw material using the screw press of this invention, pressure gas is supplied in a pressurized room 5 from the pressure gas supply line 6, the differential pressure between the internal pressure force and supply pressure of the processed raw material is held in the predetermined range, and generating of the liquid omission phenomenon through the filter cake which exists in the gap section a is made to control. As pressure gas in this case, various kinds of gas, such as nitrogen gas, air, and carbon dioxide gas, is used. The pressure in a pressurized room 5 is selected corresponding to a processed raw material supply pressure, and, generally the pressure of the range of a pressure to a pressure [ low about 0.5kg/cm<sup>2</sup> ] high about 0.5kg/cm<sup>2</sup> and the range of a desirable pressure to a pressure [ lower about 0.3kg/cm<sup>2</sup> than the supply pressure ] high about 0.3kg/cm<sup>2</sup> is chosen from the supply pressure. Moreover, the supply pressure of a processed raw

material is usually more than 0.1kg/cm<sup>2</sup>G preferably more than 0.01kg/cm<sup>2</sup>G. Moreover, the upper limit of the supply pressure is below 3kg/cm<sup>2</sup>G preferably below 5kg/cm<sup>2</sup>G. In the case of the screw press of this invention, it is usually desirable to operate it by the supply pressure of 0.1-3kg/cm<sup>2</sup>G. [0009] In the screw press of this invention, in order to make the pressure in a pressurized room 5 correspond automatically to a processed raw material supply pressure, it is desirable to make the differential pressure regulatory mechanism A connect. The pressure adjustable valve 7 which attached the differential pressure regulatory mechanism A to the pressure gas supply line 6 in drawing 1, While connecting with the pressure sensor attached to the pressurized room 5, and the pressure sensor attached to the processed feeding tubing 16 and detecting the processed raw material supply pressure and pressurized-room internal pressure Based on the detected pressure force, the pressure adjustable valve 7 attached to the pressure gas supply line 6 is operated, and the differential pressure between pressurized-room 5 internal pressure and a processed raw material supply pressure is automatically adjusted to predetermined within the limits. The thing of common use is used as a differential pressure regulatory mechanism A in this case, and a computer etc. can constitute.

[0010] In the screw press of this invention, the supernatant liquid produced by squeezing of a processed raw material flows out of the peripheral wall side of the filtration cylinder 1 into the exterior as filtrate. In this case, the solid-state concentration in a filtration cylinder is changed in accordance with the shaft orientations of that filtration cylinder, and it is distributed so that it may increase toward that direction of a tip. In order to carry out stable operation of the screw press, it is desirable to operate so that this solid-state concentration distribution may be kept constant. In order to hold said solid-state concentration distribution uniformly, it is effective to adjust the rotational frequency of a screw so that the flow rate distribution in alignment with the shaft orientations of the filtrate which flows out of the peripheral wall of a filtration cylinder may be measured and flow rate distribution of this filtrate may become fixed. In drawing 1 , 11, 12, 13, 14, and 15 are uptake members which carry out uptake of the filtrate which flows out along with the longitudinal direction of the filtration cylinder 1. The thing of arbitration is usable if it is the thing of the container configuration which can carry out uptake of the filtrate which flows out of a filtration cylinder as this uptake member. Although the filtrate by which uptake was carried out to each of these uptake members is further discharged and collected from that uptake member outside, in order that it may acquire the flow rate distribution over the shaft orientations of the filtration cylinder of filtrate in this case, the flow rates Y11, Y12, Y13, Y14, and Y15 per [ by which uptake was carried out to each uptake member ] unit time amount are measured, respectively. Measurement of this filtrate flow rate can be measured with the flowmeter connected to the filtrate exhaust pipe connected with each uptake member. The flow rate in this case may be any of capacity or weight. Those hydrometry values are sent to the filtrate flow rate distribution measurement device B as an electrical signal, and flow rate distribution is measured here. Moreover, this filtrate flow rate distribution device B has the function to adjust that flow rate distribution, and the rotational frequency of Motor M is adjusted so that the flow rate distribution which this measurement flow rate distribution was contrasted with the flow rate distribution defined beforehand, and was measured may be in agreement with that flow rate distribution defined beforehand. Although the number of installation of a filtrate uptake member is suitably defined according to the die length of the filtration cylinder 1, generally it is two or more pieces, and is three or more pieces preferably.

[0011] In the screw press of this invention, it is desirable to use the screw which does not have the screw wing 21 in the point of a screw. When using for the point of such a screw the screw which omitted arrangement of a screw wing, a non-wing band without a screw wing is formed in the point of a filtration cylinder. When this non-wing band acts as a consolidation band of a cake, gathers the rotational speed of a screw and filtration velocity is raised, since a filter cake is compressed into shaft orientations into this non-wing band and the shaft-orientations consistency of that cake rises, a liquid omission phenomenon is prevented effectively. Therefore, the raw material supply pressure raised more is employable. In this invention, it is the distance which met the medial axis of a screw towards the back end of a screw from the tip (tip of a filtration cylinder) of a screw, and it is good to consider as the non-wing band which does not have a screw wing preferably in the between to the location of the arbitration

within the limits of 5-30cm from the screw tip to the location of the arbitration within the limits of 5-50cm.

[0012] The screw press of this invention is applied as a filter (solid-liquid separator) of the various mixture containing a liquid and a solid-state. The mixture of a waste plastic particle and a hydrocarbon oil, the water slurry liquid containing a solid particulate, the aquosity slurry liquid of a seed that extracts and contains the mixture of \*\* and fats and oils, water sludge, and a calcium carbonate are included by such mixture. The screw press of this invention may be which format of a \*\* type and a horizontal type.

[0013]

[Example] Next, an example explains this invention to a detail further. In addition, % shown below is weight %.

[0014] It considered as the example 1 plastic-waste model, and the plastics mixture which consists of 1% of polyvinylidene chlorides, polyethylene terephthalate:5%, and ABS-plastics:4% was crushed polyethylene:35%, polypropylene:30%, polystyrene:20%, and polyvinyl chloride:5% in the shape of a particle (average dimension: about 20mm). Next, the mixture (mixed weight ratio =1/0.9/0.6) of polyethylene, polypropylene, and polystyrene was added at a rate of 20 weight sections to the pyrolysis light-oil 100 weight section pyrolyzed and obtained, and this debris was heated for 30 minutes at 130 degrees C under churning. By this actuation, it dissolves and a part of polyvinylidene chloride dissolves the polyethylene, polypropylene, and polystyrene in debris. On the other hand, a polyvinyl chloride, polyethylene terephthalate, and ABS plastics remained in the solution by the shape of a non-dissolved particle. Filtration processing was carried out using the screw press of the structure which showed this to drawing 1 , using the solution containing this non-dissolved plastics particle as a processed raw material. In this case, that processed raw material supply pressure was set to 1kg/cm<sup>2</sup>G, and the pressure of a pressurized room was set to 1kg/cm<sup>2</sup>G. In said filtration processing, the filter cake of a plastics particle was smoothly discharged from the gap section a at the tip of a filtration cylinder, and the liquid omission phenomenon was not produced at all. Moreover, uptake of the solution containing the plastics as filtrate was carried out to the filtrate uptake members 11-15. The filtrate capacity by which uptake was carried out to each uptake member was measured, and the filtrate flow rate distribution map to the shaft orientations of a filtration cylinder was created. Flow rate distribution of filtrate performed filtration processing by said screw press by adjusting the rotational frequency of Motor M so that it might be in agreement with this flow rate distribution map.

[0015] In example 2 example 1, from the tip before 50mm experimented using the screw which does not have a screw wing, using the thing of 100mm of diameters of a screen as a screw of the screw press of this invention, using the solution containing a non-dissolved plastics particle as a processed raw material. Consequently, even when the rotational speed of a screw was doubled and filtration velocity was gathered to the screw which has a screw wing to a tip, as shown in the following table, it was not generated at all but the liquid omission phenomenon was able to perform efficient filtration actuation. This is based on the degree to which consolidation of the filter cake is carried out rather than the case of an example 1 by the point in a filtration cylinder increasing by removing the point of a screw.

[0016]

[Table 1]

ケース	スクリューの先端部の羽根	スクリューの回転数 [rpm]	プレッサーの圧力 [kg/cm <sup>2</sup> G]	供給圧力 [kg/cm <sup>2</sup> G]	通過速度 [kg/hr]
実施例 1	あり	0.5	4.0	1.0	55
実施例 2	50mmカット	1.0	4.0	1.0	120

[0017] Filtration processing was performed like the example 1 using the water slurry liquid which contains a calcium-carbonate particle (pitch diameter of 20 micrometers) 20% as an example 3 processed raw material. In this case, the processed raw material supply pressure was set to 3kg/cm<sup>2</sup>G, and pressurized-room internal pressure was set to 3kg/cm<sup>2</sup>G. Also in such conditions, filtration actuation was able to be performed smoothly, without producing a liquid omission phenomenon.

[0018]

[Effect of the Invention] according to the screw press of this invention -- the supply pressure of a

processed raw material -- liquid omission phenomenon student \*\*\*\* -- high filtration velocity can be obtained from the ability for it to hold highly without things and to be operated. Therefore, in this invention, though it is small, the screw press of high throughput can be obtained.

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